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Total No. of Questions : 09] MAY 2008 [Total No. of Pages : 02

Paper ID [EC302]

(Please fill this Paper ID in OMR Sheet)

B.Tech. (Sem. - 6th&7th)

MICROWAVE AND RADAR ENGINEERING (EC - 302)

Time : 03 Hours **Maximum Marks : 60**

Instruction to Candidates:

1) Section - A is **Compulsory**.
2) Attempt any **Four** questions from Section - B.
3) Attempt any **Two** questions from Section - C.

Section - A

Q1) *(10 × 2 = 20)*

a) What is the basic difference between TWT and Magnetron?

b) What is a Rat-race junction?

c) For a radar operating at 10 GHz and PRF of 300 Hz, calculate the first, blind speed.

d) For a radar, peak transmitted power is 1 MW, pulse width is 1 μ sec and PRF is 1kHz. Calculate the average transmitted power?

e) Enlist the factors that determine the detection range of a radar.

f) What is velocity Modulation?

g) What is the basic difference between IMPATT and TRAPAT diodes?

h) List the what is the main idea behind obtaining -ve Resistance in a Gunn diode biggest disadvantages of IMPATT diode?

i) What is the main idea behind obtaining -ve Resistance in a Gunn diode?

j) Why TEM waves not be propagated in waveguides?

Section - B

(4 × 5 = 20)

Q2) Discuss the operation of a tunnel diode with its V-I characteristics.

Q3) Write notes on the following :

(a) Probes and loops

(b) Circulators and isolators.

Q4) A magnetron has following parameters.

Inner radius = 0.15 m

Outer radius = 0.45 m

Magnetic flux density = 1.2 mw/m^2.

Find hull's cut-off voltage, magnetic flux density if beam voltage is 6000 v and cyclotron frequency in GHz.

Q5) Consider a radar with multiple PRF ranging using f_1 = 13.770 kHz and f_2 = 14.580 kHz. Calculate the need of multiple PRF.

Q6) Write a brief technical note on an actual radar system.

Section - C

(2 × 10 = 20)

Q7) Derive an expression for blind speed of an MTI radar. Discuss the effect of large wavelength and large pulse repetition frequency on lowest blind speed of target. What is staggered pulse repetition frequency and what are its advantages?

Q8) What are Ferrites? Discuss behaviour of ferrites in isolators and circulators.

Q9) (a) Explain VSWR measurement in microwaves.

(b) Discuss method for measurement of low and high microwave power.

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